

REMARKS

The Office Action of May 14, 2004 has been received and carefully reviewed. Pending claims 1-24 and 27 remain rejected in the Office Action of May 14, 2004 on the same grounds as in the previous Office Action of February 24, 2004, wherein the claim rejections in paragraphs 1-9 of the current Office Action appear to be replicated from paragraphs 1-9 of the Office Action of February 24, 2004. Applicants reiterate and incorporate herein the remarks of the response of March 8, 2004, and respectfully request reconsideration and allowance of pending claims 1-24 and 27 in light of those remarks, and the additional remarks provided below.

All of the pending claims stand rejected with respect to U.S. Patent No. 6,159,821 to Cheng et al., alone or in combination with various cited secondary references. As set forth in Applicants' previous response, Cheng et al. fail to teach, suggest, or otherwise make obvious the subject matter of the pending claims. Cheng et al. appear to be directed to methods for shallow trench isolation, in which shallow trenches 16 are etched into a semiconductor substrate 10 (FIGs. 2 and 7 of Cheng et al.), and the trenches are filled with oxide 17 (FIGs. 3 and 8), wherein the oxide 17 of Cheng et al. remains in the trenches (FIGs. 5 and 11).

In the previous response, Applicants pointed out that the oxide 17 of Cheng et al. is not a sacrificial material. The current Office Action states at page 11 that "[t]he oxide layer 17 as disclosed by Cheng et al. is a sacrificial material since it is being used to fill the trenches 16 and later dry-etched away", referring to col. 2, lines 33-64 and FIGs. 1-5 of Cheng et al. Applicants note that ***the oxide material 17 of Cheng et al. remains in the trenches, as illustrated in FIGs. 5 and 11.*** Furthermore, Applicants note the portion of the text cited in the Office Action does not indicate or remotely suggest complete removal of the trench oxide 17. Although Cheng et al. state that "the silicon nitride layer 14 and oxide layer 17 over the surface of the substrate are then dry-etched away." (col. 2, lines 54-56), this statement is clearly limited to the portion of the oxide 17 *over the surface of the substrate*, and in no way teaches or suggests that the oxide 17 in the trench is removed or even etched. This is particularly clear when viewed in light

of Cheng et al. FIG. 5 to which the statement is directed, wherein the oxide 17 remains in and completely fills the trenches. In further reference, Cheng et al. state at col. 2, lines 65-67, that "[t]he dry etch process rounds the shoulders of the oxide layer 17 as it removes the silicon nitride layer 14 and pad oxide layer 12", thus indicating to persons of ordinary skill in the art that **the dry etch process** used to remove the silicon nitride mask 14 and the pad oxide 12 of FIG. 4 **in Cheng et al. leaves the oxide 17 in the trenches.**

In a second embodiment (FIGs. 6-11), Cheng et al. show a sacrificial material 13 formed over the pad oxide 12, and indicate that the material 13 may be an oxide. The Office Action refers at pages 11-12 to col. 3, lines 3-10 of Cheng et al., and states that "a sacrificial oxide layer is used to protect the surface of the substrate from etch damage". However, Applicants note that the material 13 is illustrated in Cheng et al. FIG. 6 prior to formation of the trenches 16 in FIG. 7, and is not illustrated as filling any gaps. Thus, while the material 13 of Cheng et al. is described therein as 'sacrificial', it is not a sacrificial material or layer that fills the gaps as in Applicants' independent claims 1, 10, 19, 21, 24, or 27.

With respect to independent claim 1 and claims 4 and 5 depending therefrom, Applicants therefore submit that Cheng et al. fail to teach or suggest **coating the substrate with a sacrificial material that fills the gaps**, and also fail to teach or suggest **plasma etching to strip the sacrificial material and the hard mask substantially completely in a single plasma etch process**, and accordingly request reconsideration and withdrawal of the rejections thereof under 35 U.S.C. § 102.

With respect to independent claim 10 and claims 2, 3, and 13-15 depending therefrom, Applicants submit that Cheng et al. fail to teach or suggest **coating the substrate with a sacrificial material**, and **plasma etching to strip the sacrificial material and the hard mask substantially completely in a single plasma etch process**, and accordingly request reconsideration and withdrawal of the rejections thereof under 35 U.S.C. § 102.

With respect to independent claim 19 and claims 7, 11, and 20 depending therefrom, Applicants submit that Cheng et al. fail to teach or suggest ***providing a sacrificial material that*** covers the hard mask and ***fills gaps*** in the surface patterned with the hard mask, and accordingly request reconsideration and withdrawal of the rejections thereof under 35 U.S.C. § 102.

With respect to independent claim 27, Applicants submit that Cheng et al. fail to teach or suggest ***coating the substrate with a sacrificial material that fills the gaps, and plasma etching to strip the sacrificial material and the hard mask in a single plasma etch process***, and accordingly request reconsideration and withdrawal of the rejections thereof under 35 U.S.C. § 102.

With respect to the rejection of claims 6, 8, 9, 12, 16-18, and 21-24 under 35 U.S.C. § 103 as being unpatentable over various combinations of Cheng et al., with U.S. Pat. No. 5,270,265 to Hemmenway et al., and U.S. Patent No. 5,998,278 to Yu, Applicants reiterate the remarks of the previous response, and submit that these claims are patentably distinct from the proposed combinations of these references, and accordingly request reconsideration and withdrawal of these rejections.

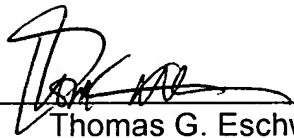
III. CONCLUSION

For at least the above reasons, the claims currently pending in the application are believed to be in condition for allowance and reconsideration thereof is requested.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Should any fees be due as a result of the filing of this response, the Commissioner is hereby authorized to charge the Deposit Account Number 50-1733, FASP714US.

Respectfully submitted,
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CERTIFICATE OF MAILING (37 CFR 1.8a)

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to: Mail Stop AF Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Date: June 2, 2004


Christine Gillroy